

The relationship between cause of death of the kidney donor and the presence of ischemic lesions in the kidney

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Chronic ischemic lesions in the donor kidney amplify the nephrotoxic effects of cyclosporine A [1]. With increasing age, the presence of chronic ischemic lesions in the kidney increases [2], and data concerning the fate of kidney grafts from older donors are conflicting [3–6]. Kidney from donors with an intracerebral bleed do less well compared to kidneys from other donors. Systematic data on the relationship between donor age, cause of death and severity of chronic ischemic lesions are lacking. This study was performed to investigate this relationship.

Key words: Age – Chronic ischemic lesions – Intracerebral bleeding

Materials and methods

Biopsies of 156 consecutive cadaveric donor kidneys from patients, via Eurotransplant, reported to have died from intracerebral bleeding, subarachnoidal bleeding or trauma, were studied for the presence of pre-existing ischemic lesions. The biopsies were taken by a surgical procedure 1 h after reperfusion of the grafts.

The following items were scored blindly by one investigator on a semiquantitative scale (0–2): glomerulosclerosis, arteriosclerosis, interstitial fibrosis and mesangial proliferation. A score of 0 indicated no abnormal findings; a score of 2, severe abnormality. The individual scores were added (summation-score). Differences between the various groups were analyzed by the unpaired Student's *t*-test and a *P*-value of less than 0.05 was considered to be statistically significant. Multiple regression analysis was performed for the total group of biopsies with, as dependent variables, the individual scores and the summation-score. The predictive variables were donor age, cause of death of the donor and sex.

The patients reported to have died from subarachnoidal bleeding are included in the trauma group.

Results

The donor population consisted of 104 (66.7%) males and 52 (33.3%) females. In 119 (76.3%) the cause of death was intracerebral bleeding; in 37 (23.7%) a traumatic death or death due to subarachnoidal bleeding was reported. Of the males, 83 (79.8%) died of intracerebral bleeding and 21 (20.2%) of trauma. In the female group these figures were 36 (69.2%) and 16 (30.8%) respectively. These differences were not statistically significant. The mean age of the men was 30.9 years, and of the women, 37.8 years. The mean age of those donors dying of intracerebral bleeding was 46.0 years, and of those dying of trauma or subarachnoidal bleeding, it was 29.2 years. This difference reached statistical significance ($P < 0.01$).

The individual ischemic scores and the summation-score according to cause of death are reported in Table 1. The differences all reached statistical significance. This does not hold for the scores according to sex of the donor (Table 2). Regression analysis was done with the individual scores and the summation-score as dependent variables and the age of the donor, the cause of death and sex as predictive variables. In Table 3 the correlations between dependent and predictive variables are shown. In the trauma group the same pattern of significance was seen. In the intracerebral bleeding group only the correlations between age and vascular score, and age and summation-score were significant. It appeared that the predictive variables had significant correlations with all the dependent variables. When regression analysis was performed,

Table 1. Cause of death

	CVA	Trauma
Mean age	46.0	29.2*
glomerular score	0.95	0.32*
vascular score	1.03	0.46*
mesangial score	0.97	0.40*
interstitial score	0.57	0.24*
sum-score	3.51	1.42*

* $P < 0.01$

Table 2. Data according to sex

	Male	Female
Mean age	30.9	37.8*
glomerular score	0.44	0.52 ns
vascular score	0.57	0.65 ns
mesangial score	0.51	0.60 ns
interstitial score	0.34	0.27 ns
sum-score	1.86	2.04 ns

* $P < 0.01$ **Table 3.** Correlations

	Sex	Age	Cause of death
Sex	1		
Age	0.208*	1	
Cause of death	0.117	0.455*	1
Vascular score	0.065	0.418*	0.382*
Interstitial score	-0.059	0.389*	0.261*
Mesangial score	0.068	0.412*	0.402*
Glomerular score	0.050	0.460*	0.370*
Summation-score	0.043	0.522*	0.442*

* $P < 0.05$

the age of the donor had a more direct effect on the individual scores and the summation-score than the cause of death (glomerular score beta 0.367 vs 0.203, vascular score beta 0.308 vs 0.243, summation-score beta 0.455 vs 0.257). Only in the case of the mesangial score was the effect identical (beta 0.289 vs 0.270). The interstitial score was influenced more by sex than by cause of death.

Discussion and conclusion

The relative influence of donor age and cause of death on the presence of ischemic lesions in the donor kidney is a factor to be considered when accepting a particular patient as a donor. The occurrence of an intracerebral bleed is related to the presence of hypertension, and there is a correlation between the presence of high blood pressure and certain ischemic lesions in the kidney [7]. However

the number of ischemic lesions increases with age, even in the absence of hypertension [8].

Our findings suggested that age is the main determinant for the development of ischemic lesions. So the fact that the patient who died of intracerebral bleeding had significantly more ischemic lesions could be explained because they were older. However the data were collected retrospectively and the cause of death could not be verified. Because a subarachnoid bleed is usually due to a congenital abnormality of the vessel and is not associated with hypertension, these patients were included in the trauma group. Therefore, we could not exclude the possibility that some patients, reported as having died of intracerebral bleeding, in fact died of a subarachnoid bleed. A prospective study is necessary to exclude the possibility of this bias.

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